Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	AU Docket No. 12-25
Mobility Fund Phase I Auction Scheduled for September 27, 2012	)	
	)	

REPLY COMMENTS OF AT&T

Pursuant to the Public Notice released February 2, 2012,[1] AT&T Inc., on behalf of its wholly owned subsidiaries ("AT&T"), respectfully submits these reply comments on the competitive bidding procedures for Auction 901 and on certain program requirements.

DISCUSSION

In these reply comments, we focus primarily on certain auction design issues raised in the Public Notice and the comments, since it is the auction design the Bureaus choose that will primarily determine whether the auction succeeds or fails. We also highlight several of the important points made in the comments filed by Professor Aleksandar Pekeč[2] and in those filed by Professors Belloni, Brusco, Lopomo, and Marx (hereinafter Professors Belloni *et al.*).[3] Professors Pekeč and Professors Belloni, *et al.* are all academic experts in auctions or operations research. Their comments highlight some of the serious problems associated with allowing providers to choose individually how they aggregate eligible census blocks and then submit

[1] *Mobility Fund Phase 1 Auction Scheduled for September 27, 2012: Comment Sought on Competitive Bidding Procedures for Auction 901 and Certain Program Requirements*, Public Notice, AU Docket No. 12-25 (rel. Feb. 2, 2012) ("Public Notice").

[2] Comments of Aleksandar Saša Pekeč ("Pekeč Comments").

[3] Comments of Alexandre Belloni, Sandro Brusco, Giuseppe Lopomo, and Leslie Marx ("Belloni *et al.* Comments").

multiple package bids. Given the authors' deep expertise in this field of study, the Bureaus should give their comments considerable deference. Finally we address two other issues that were widely discussed in the comments.

I. Auction Design

As we indicated in our initial comments, AT&T believes that any auction design the Bureaus adopt should satisfy at least three criteria. First, it should be simple and transparent, so that bidders can calculate appropriate bids and the Bureaus can determine the winners in a manner that is understood and credible to participants and outside observers. Second, it should be efficient in the sense that the limited funds will be distributed so as to maximize the number of unserved areas that will receive new 3G or 4G wireless broadband service. Finally, the auction design should minimize the incentives and opportunities for strategic behavior and gaming. Unfortunately, AT&T believes that the Bureaus' proposal to adopt a bidder-defined aggregation approach fails to satisfy these criteria, and we believe that that Professor Pekeč and Professors Belloni *et al*. share our fundamental concern.

In the *USF/ICC Transformation Order*, the Commission determined that "the census block should be the minimum geographic building block for which support is provided."[4] In the Public Notice, the Bureaus recognize that some aggregation of census blocks will be necessary and propose to allow individual bidders to build idiosyncratic aggregations of census blocks and submit all-or-nothing package bids on these aggregations.[5] In order to simplify the determination of winners, the Bureaus propose to limit aggregations of eligible census blocks to

[4] *Connect America Fund, WC Docket No. 10-90, A National Broadband Plan for Our Future, GN Docket No. 09-51, Establishing Just and Reasonable Rates for Local Exchange Carriers, WC Docket No. 07-135, High-Cost Universal Service Support, WC Docket No. 05-337, Developing an Unified Intercarrier Compensation Regime, CC Docket No. 01-92, Federal-State Joint Board on Universal Service, CC Docket No. 96-45, Lifeline and Link-Up, WC Docket No. 03-109, Universal Service Reform — Mobility Fund, WT Docket No. 10-208, Report and Order and Further Notice of Proposed Rulemaking*, FCC 11-161 (rel. Nov. 18, 2011) (*USF/ICC Transformation Order*) at ¶346.

[5] Public Notice at 9.

those in a single Cellular Market Area ("CMA") and to limit a provider's number of package bids per CMA to three.[6] The Bureaus further propose to allow multiple winners for a specific area if, by doing so, it will maximize the total number of unserved road miles that receive 3G or better broadband wireless service, while staying within the $300 million budget constraint.[7]

As detailed in our comments and those of Professor Pekeč and Professors Belloni *et al.*, the proposal to allow bidders to submit package bids on bidder-defined aggregations increases the complexity of the auction greatly and introduces additional problems. Moreover, the Bureaus' efforts to simplify the auction by constraining severely the number of possible bids from each provider will tend to negate any potential efficiencies from bidder-defined aggregations while not solving the fundamental problems of the proposed combinatorial auction.

First, and fundamentally, combinatorial auctions make it more difficult to determine winners.[8] In fact, allowing unrestricted package bidding may make it impossible to determine the winners. As Professors Belloni *et al*. point out, allowing "an unrestricted combinatorial auction for 491,000 census blocks is not feasible due to issues of computational complexity."[9] Similarly, Professor Pekeč argues that, if the Commission allows bidder aggregation, it needs to "protect the auction procedure from bidders who might try to submit an unreasonable number of bids."[10]

Second, as Professors Belloni *et al.*, point out, adopting a combinatorial auction "will create significant opportunities for strategic manipulation of the auction."[11]

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[6] *Id.*, at 11, ¶32.

[7] *Id.*, at 11, ¶34.

[8] AT&T Comments at 7.

[9] Belloni *et al.* Comments at 2.

[10] Pekeč Comments at 1.

[11] Belloni *et al.* Comments at 2. *See also* AT&T Comments at 8-9.

Third, employing bidder-defined aggregations introduces the possibility of partially overlapping bids. Partially overlapping bids exacerbate the first two problems and create new problems, regardless of whether the Bureaus permit or prohibit overlapping support. We consider each of these alternative scenarios below.

Allowing Overlapping Support: In the Public Notice, the Bureaus propose to evaluate bids and award support so as to maximize the number of eligible road miles that would receive coverage.[12] As the Bureaus acknowledge, this means that "multiple winners could receive support to cover the same eligible road miles."[13] This approach would complicate the determination of winners as the Bureaus would have to consider not only the effect on coverage if it granted exclusive support, but also all possible overlaps and the effect on total road coverage of granting overlapping support. Such a calculation may be difficult to explain to outside parties, but more importantly, it would complicate the bidding strategy of competing providers. As we explained in our initial comments, if there is a possibility that a bidder that is awarded support might face competition from another provider that also receives support for the same census blocks, then this would affect the first provider's likely profits, which would affect its bid. This possibility is likely to cause all bidder to raise their bids.[14] Or as Professor Pekeč explains:

> While a small overlap [in support] could increase coverage within the predefined budget, . . . bidders' valuations would likely depend on whether they would be offering service alone or in competition with another provider. Therefore, if overlaps are allowed, bidders might adjust their bids accordingly. . . [15]

Finally, as we explained in our initial comments, under a combinatorial auction, even with possible overlapping support, some areas that, based on cost, should receive support for

[12] Public Notice at 11, ¶34.

[13] *Id.*

[14] AT&T Comments at 11.

[15] Pekeč Comments at 2.

mobile broadband deployment, may not receive it because of a partially overlapping lower bid.[16] Such a result may be viewed by some as a failure in the Commission's auction design.

Prohibiting Overlapping Support: Because of the problems associated with providing overlapping support, Professor Pekeč recommends that, if the Bureaus decide to adopt bidder-defined aggregations, they should limit support to one provider per eligible census block.[17] While we agree with Professor Pekeč that prohibiting overlapping awards of support is preferable to allowing it, we note that this would not eliminate all problems associated with partially overlapping bids. As we explained in our initial comments, there would remain the possibility that areas that should receive support may not because of a partially overlapping lower bid.[18] In other words, if the Commission chooses to prohibit overlapping awards of support, the Commission will be required to reject an otherwise acceptable bid because it contains just one census block that overlaps with another lower bid that the Commission has selected. In addition, eliminating overlapping support would not eliminate the problem of strategic bidding.[19] As we explained before, with bidder defined aggregations, bidders will have an incentive to offer bids on narrow, low-cost groups of census blocks, even where it might be more socially efficient, due to geographic complementarities, to offer a bid on a broader collection of census blocks.[20] In the extreme, a bidder might offer a low bid on a single eligible census block in order to prevent a competing bidder from receiving support for a much larger area that includes that single census block.

[16] AT&T Comments at 10-11.

[17] Pekeč Comments at 2.

[18] AT&T Commensts at 8-9.

[19] *Id.*, at 9.

[20] *Id.*, at 9-10.

The Bureaus' proposals to address these problems do not solve them, and, as we discussed in our initial comments, they create new problems. For example, in order to make the winner determination problem manageable, the Bureaus' propose to limit each provider's number of package bids to three per CMA. But this would severely limit providers' ability to develop bids that reflect fully all of the cost complementarities among contiguous census blocks within a CMA.[21] In addition, because of the threat of gaming, bidders are likely to submit bids for narrow, low cost areas, involving relatively few census blocks, and winning bids are unlikely to take advantage of broader cost complementarities.[22] Further, the limit on the number of allowed bids per CMA would not allow bidders sufficient flexibility to respond effectively to this threat of gaming. Nor does the Bureaus' suggestion that it might permit contingent bids, in order to counter the problem of overlapping support, solve the problem. Rather, setting a limit of three bids per CMA makes it almost impossible for bidders to develop and submit efficient bids that capture geographic complementarities and that address the complications arising from the possibility of overlapping support. As a result, providers may be deterred from bidding other than on small sets of the very least costly, eligible census blocks. Moreover, allowing contingent

[21] *Id.*

[22] Professor Pekeč highlights a further important drawback from this characteristic of bidder-defined aggregations: unserved blocks that are not "winners" of the Phase I auction will likely become more expensive to support in Phase II. As he notes, "the optimal allocation [of support] in this auction cannot be looked at in isolation of estimated costs of eventually providing coverage to all areas." Pekeč Comments at 3. He notes that census blocks that do not receive support in the Phase I auction "could become disconnected and leave little room for synergies in subsequent attempts to ensure coverage, hence raising future costs to the Commission." *Id.* The reason for this is as follows. If the Phase I auction results in only a few of the unserved census blocks within a census tract receiving support, the cost for any provider subsequently to serve the remaining unserved blocks within a tract is elevated *unless that provider is the one that received Phase I support and deployed nearby 3G or 4G facilities*. This suggests that providers that did not win the Phase I auction are unlikely to submit low-cost bids in the Phase II auction. Further, the only provider is capable of serving Phase II unserved blocks economically is the provider that won the Phase I auction and deployed 3G or 4 G facilities to nearby census blocks. But because this provider will recognize that it has a unique cost advantage, it will not bid aggressively in the Phase II auction. This ensures the unfortunate result that Phase II costs for supporting residual unserved blocks will be higher if the Phase I auction design encourages overly narrow bids. In contrast, predefined Phase I bid areas are likely to receive bids covering a *wider* range of unserved census blocks and so should present fewer difficulties for Phase II support distribution.

bids further complicates the winner determination problem. In sum, in its effort to make the winner determination problem tractable, the Bureaus propose severe restrictions on bidding, which AT&T believes will prevent bidders from developing efficient bids or addressing possible strategic behavior, which is likely to discourage participation in the auction. As a result, despite the theoretic ability of a combinatorial auction to result in an efficient distribution of support where bidders submit package bids consisting of unrestricted bidder-defined aggregations of eligible census blocks, it is almost certain that the restrictions the Commission must impose to make the auction process manageable will negate its ability to realize these potential efficiencies from a bidder-defined methodology.[23]

It is significant that both Professor Pekeč and Professors Belloni *et al.* independently conclude that the complications and problems associated with bidder-defined aggregations are so serious that they recommend rejecting this approach. Instead, Professor Pekeč recommends adopting the Bureaus' alternative proposal to use predefined aggregations of eligible census blocks, aggregated to the census tract level. He would also possibly allow package bids of up to three contiguous tracts.[24] Professors Belloni *et al.*, on the other hand, recommend using a simultaneous, multi-round, descending auction, which they claim will allow bidders to take into account geographic complementarities.[25]

AT&T agrees with Professor Pekeč's support of the alternative proposal to use predefined aggregations of eligible census blocks. But we do not support Professor Pekeč's

[23] The large number of unresolved issues that Professor Pekeč and Professors Belloni *et al*. raise as to the methodology for actually implementing an auction incorporating bidder-defined aggregations highlights the need for the Bureaus, should they decide to adopt a bidder-aggregation approach, to issue a further Public Notice that details with specificity their proposed algorithms for determining winners and awarding support amounts. In addition, further time should be allotted for parties to examine and comment on this detailed design before any final decision is adopted.

[24] Pekeč Comments at 2.

[25] Belloni *et al.* Comments at 3-4.

suggestion that the Commission also might allow package bids of up to three contiguous census tracts, because we do not believe that geographic complementarities between relatively large census *tracts* (as opposed to complementarities between much smaller census *blocks*) are of sufficient magnitude to justify the added complexity and problems associated with package bidding.[26] Likewise, we do not believe that geographic complementarities between census tracts justify the significantly more complex descending auction proposed by Professors Belloni *et al.* Although Professors Belloni *et al.* do not fully specify their proposed auction design, it appears that it would be extremely complicated for bidders to identify, in each round of the auction, those individual census blocks, out of the nearly 500,000 eligible census blocks, where they would be willing to provide wireless broadband service for a support level that varies with each round. Thus, while AT&T agrees with the auction experts that a bidder-defined approach to aggregation should be rejected, we differ from Professor Pekeč and Professor Belloni *et al.* in that we believe that the predefined census tract approach proposed in the Public Notice should capture enough of geographic complementarities so as to result in a reasonably efficient distribution of support. As we stressed in our initial comments, in this first reverse auction, it seems prudent to err on the side of simplicity and practicability in order to maximize the chances that the auction will succeed.

II. Other Issues

Below, we briefly address two other issues raised in the comments

Publication of the Optimization Algorithm: As AT&T pointed out in its initial comments, whatever aggregation approach and optimization algorithm the Bureaus decide to adopt, it is critical that the Bureaus publish the algorithm well before the auction, so that

[26] We calculate that the average area of census tracts containing one or more eligible census blocks is 412 square miles, and many of the more rural census tracts are significantly larger.

interested parties will have sufficient time to evaluate the algorithm and to determine whether it executes properly and works as desired.[27] As with any complex software program, it is common for there to be small (or large) bugs, and this auction is too important to risk logic error or software failure.

Coverage Requirements In the Public Notice, the Bureaus sought comment on whether, under a bidder-defined approach to aggregation, it should adopt a higher coverage requirement of 95 or 100 percent.[28] All commenters that addressed this issue oppose the proposal, and for good reason. As United States Cellular Corporation explained:

> Individual carrier bids will be generally higher on a per-unit basis to meet a 95% or 100% threshold and therefore the extra support needed to cover the areas above 75% will yield fewer benefits nationwide. By lowering the threshold to 75%, carrier bids nationwide will be lower, increasing the overall reach of the $300 million budget because more investment dollars will be spent in rural areas with no 3G service and with a greater density of eligible road miles on a per-cell site basis.[29]

Because the cost of deploying mobile wireless broadband is likely to vary within census tracts, particularly rural census tracts, it will be significantly more expensive (in terms of cost per road mile) to cover the last 10 percent or 5 percent of the area than it is to cover the first 90 to 95 percent. Thus, by raising the coverage requirement, this will mean that far fewer census tracts will benefit from the $300 million in Phase I support. This would not represent the most effective use of these limited funds.

CONCLUSION

Combinatorial auctions have theoretical appeal where there exist complementarities among the items being auctioned. Unfortunately, as is well known, they are significantly more

[27] AT&T Comments at 6. *See also* Verizon Comments at 4.

[28] Public Notice at 11.

[29] United States Cellular Corporation Comments at 7-8; *see also* AT&T Comments at 12-13.

complex than simpler auction designs. Not only is the winner determination problem more difficult (and sometimes unsolvable), but package bidding increases the likelihood of partially overlapping bids, makes it more difficult for bidders to develop socially efficient bidding strategies, and creates incentives and opportunities for gaming. The Bureaus attempt to deal with the winner determination problem by severely limiting the number of bids per CMA, but this may make it impossible for bidders to develop efficient bids that reflect geographic complementarities, and it does not solve the problems of partially overlapping bids or strategic bidding. In light of these problems, the Bureaus should adopt the simpler alternative of aggregating eligible census blocks into census tracts and then independently auctioning off the eligible census tracts, in a single round, sealed bid auction. Once the Bureaus decide on their auction algorithm, they need to publish it, so that interested parties have the opportunity to evaluate it and determine whether and how it works. Finally, the Bureaus should not adopt a higher coverage requirement of 95 or 100 percent, as this would result in far fewer eligible census tracks receiving wireless broadband coverage.

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